

WHAT IS CLAIMED IS:

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1. A method for identifying a bioactive compound, the method comprising the steps of:  
contacting a host cell with a candidate bioactive compound; and  
detecting expression of a stress response gene by the host cell in response to said contacting;  
wherein expression of the stress response gene indicates that the bioactive compound has activity as a drug.

2. The method of claim 1, wherein the host cell is a wildtype host cell, and wherein detection of an increase in expression of the stress response gene in the presence of the candidate bioactive compound indicates that the candidate bioactive compound has activity as a drug.

3. The method of claim 1, wherein the host cell contains a heterozygous deletion in a target sequence, and wherein detection of a relatively low or undetectable increase in expression of the stress response gene indicates that the candidate bioactive compound has activity as a drug and that the host cell having the heterozygous deletion is sensitive to the drug activity of the compound.

4. The method of claim 1, wherein the host cell comprises a stress response gene reporter construct, wherein expression of the stress response gene reporter construct is indicative of a stress response in the host cell.

5. The method of claim 4, wherein the host cell is a wildtype host cell, and wherein detection of an increase in expression of the reporter gene construct in the presence of the candidate bioactive compound indicates that the candidate bioactive compound has activity as a drug.

6. The method of claim 4, wherein the host cell contains a heterozygous deletion in a candidate target sequence, and wherein detection of a relatively lower level of expression of the reporter gene construct indicates that the candidate bioactive compound has activity as a drug and that the host cell having the heterozygous deletion is sensitive to the drug activity of the compound.

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7. The method of claim 6, wherein at least two or more host cells, each having a heterozygous deletion in a different target sequence, are contacted with a candidate drug in a single culture, and wherein expression of the reporter gene construct in each strain provides for a unique detectable signal for detection of reporter gene expression.

8. The method of claim 1, wherein the host cell is a yeast cell.

9. The method of claim 8, wherein the stress response gene is selected from the group consisting of *HSP26*, *HSP12*, *HSP42*, *HSP78*, and *HSP82*.

10. The method of claim 8, wherein the stress response gene is selected from the group consisting of *YFL030W* and *XNL194C*.

11. A method for identifying a target gene product of a bioactive compound, the method comprising the steps of:

contacting a host cell with a bioactive compound, wherein the host cell is altered in expression of a target gene product; and

detecting a level of expression of a stress response gene by the host cell in response to said contacting;

wherein a low or undetectable level of expression of the stress response gene in the host cell relative to a level of expression in a wildtype host cell exposed to the bioactive compound indicates that the host cell is altered in expression for a target gene product that is involved in mediating resistance or sensitivity to the bioactive compound.

12. The method of claim 11, wherein the host cell comprises a stress response gene reporter construct, wherein expression of the stress response gene reporter construct is indicative of a stress response in the host cell.

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13. The method of claim 11, wherein at least two or more heterozygous deletion strains are contacted with the drug in a single culture, and wherein expression of the reporter gene construct in each strain provides for a unique detectable signal for detection of reporter gene expression.

14. The method of claim 11, wherein the host cell is a yeast cell.

15. The method of claim 14, wherein the stress response gene is selected from the group consisting of *HSP26*, *HSP12*, *HSP42*, *HSP78*, and *HSP82*.

16. The method of claim 14, wherein the stress response gene is selected from the group consisting of *YFL030W* and *YNL194C*.

17. A method for determining the drug resistance or sensitivity of a microorganisms, the method comprising the steps of:

contacting a microorganism with a drug; and

detecting expression of a stress response gene by the microorganism in response to said contacting;

wherein expression of the stress response gene by the microorganism in the presence of the drug indicates that the microorganism is sensitive to the drug.

18. The method of claim 17, wherein the microorganism is comprised in a biological sample obtained from a subject suspected of having an infection with the microorganism.

19. The method of claim 17, wherein the biological sample is selected from the group consisting of blood, plasma, serum, urine, and saliva.

20. A kit for use in determining the drug resistance or sensitivity of a microorganism, the kit comprising:

- a control host cell; and
- a reagent for detection of expression of a stress response gene in the control host cell and in a test sample suspected of comprising a microorganism for which drug resistance or sensitivity is to be determined.

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